TRADING

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CH1: ORDERS

order: set of instructions related to a trade (what, when, buy/sell, quantity, other condition, period)

why? Investors can protect their interest (react slow, vs dealer: fast) & force to think before act

3 types of order: mkt, limit, other (stop, tick sensitive, mkt-not-held)

Market order (current available price, immediately)
Cons: pay a price for immediacy, execution price uncertainty (order places vs executed),
You pay bid-ask spread (still sometimes an order receives price improvement)
Pro: execution certainty

Large mkt order: price impact, counterparties keep depth limited to protect themselves (face risk of adverse selection). Nota: price impact (increase with order size, and larger in less liquid mkt)

For: urgent need (liquidity shock, benchmark, info), liquid stocks, seek small position

Limit order (best available price ala it is not worse than the limit price)
If don't find counterparty, sits it LOB (limit order book) til expires/canceled
Cons: less likely to be executed

A mktable limit order: immediately, most aggressive -> market def as range that includes highest bid & lowest ask

- Price of blo >= lowest existing ask
- Price of slo <= highest existing bid

Evaluation of limit order:

- provide liquidity to other traders
- provide free options to traders
  sell: calls ; buy: puts . As options, valuable to the counterparty (3): higher vola, longer limit order stands, closer strike price to mkt (more distant limit order if vola is high)

  not always free: mkt offer rebates

Pro: hope get better price: buy < ask, sell > bid; save on cost of trade (lower fees)
Cons: mkt moves away from limit price, order may never execute -> need to be patient and run risk of never filling the order (Buffet and Walmart)

Winner curse: price moves against limit order traders (price rises, you sell, price keep rising)

Limit order and rebates: traders supply liquidity and earn the rebate upon order execution

For (5): patient, value traders, illiquid stocks, looking for rebate, reduce trading costs.

Stop orders (order stopped from executing til the price reaches a stop price specified by the trader ->
hits stop price: order activated --> usually a mkt order)

Stop loss order: sell at best possible price if price drops below a certain level
Pro: ahead of key data reports, place stop orders to buy just above or sell just below the prevailing price -> get in early on the wave of trading

Trailing stop order: (stop price changes trails market) - ie P-2 (tracks P if P rises, but unchanged if p goes down)

Tick-sensitive order: (conditioned on last price change) ... can only be executed if the last ...

- Buy downtick order: non-zero price change < 0
- Sell uptick order: non-zero price change > 0

Pro: help counter price changes, lead to price improvement of one tick

Market-not-held: order do not need to be filled immediately -> give broker discretion
Often used with large orders

Validity instructions: GTC / MOO / MOC
Quantity instructions: AON / IOC / FOK (comb of aon and ioc)
Nota: AON (sits hidden in LOB until there is sufficient volume to absorbs the entire order)

algorithmic order: optimal trading strategy (how – historical depth) , when (time-day) , where (to send order – mkt which has best price and offered quickest execution in the past)
goal: min price impact and max speed of execution -> part institutional trading

(broker often advertise low/zero commission -> catch: route order to specific market makers and be paid for doing so --> could worsen the price investors gets in)

CH2: MARKETS

Set of arrangements and rules governing trading -> trader need to know market structure before placing their traders (determines order placement strategy)

Market structure: implication (3) for liquidity, efficiency, price patterns (through its effects on trader behavior)

Trading session: call vs continuous

Call (only at certain times), continuous (through trading day) and hybrid

Call: order matched in a batch, liquidity is high during each call but goes to zero outside the call, q dem = q supplied

Continuous: greater flexibility BUT cost is reduced liquidity -> higher trading costs -> ability to always trade not always a good idea

Liquid stocks: continuous market

Illiquid stocks: call markets (why)

Hybrid: NYSE (starts with a call, then continuous trading)

Execution system: quote-driven vs order-driven vs brokered markets differ degree of dealer participation

Quote-driven dealer p in each trade (prices at which trade occurs are quoted by dealers); preferred dealer (if >1); ex: NASDAQ/corporate bond market

Orden-driven no dealer intermediation -> rules for matching buyer & seller orders (2): order precedence / trade pricing; electronic

Brokered markets: b & s are matched by brokers (larger order and/or illiquid market); ex: market for block trades and the FX market

Hybrid: both quote-driven & orden-driven; NYSE (frequent dealer participation if liquidity is low); NASDAQ (dealers execute limit orders); brokers (executed blocs trades in both markets)

Market information markets sell their trade and quote data

Transparent markets quickly report information: equity (transp) VS corporate (opaque -> better for informed investors and market manipulators)

- Information in the limit order book can range from the best bid and ask prices to multiple price levels. Access to detailed order book information is often restricted due to traders' reluctance to share it

Order Routing: The system for communicating orders to the market and confirming/canceling trades. Electronic routing is "quick and reliable" but limited in handling unusual orders. Traditional methods (phone, floor brokers) are useful for large or difficult orders and allow for discussion of market conditions (volatile/illiquid)

In floor trading systems (#electronic trading) trades are executed on the exchange floor (NYSE floor). In some markets floor and automated trading coexist.

Other markets: ECNs, Dark pools, Crossing networks, the block trade networks

ECNs (electronic communications networks): Archipelago, Instinet in the US, Chi-X Europe and Turquoise in Europe

Purely electronic platforms that "Work like the book shown in Orders." They offer advantages like being "Automatic," "Anonymous," "Low cost," and "Quick." However, they "Need volume to ensure liquidity" and are "Unlikely to work for unusual orders." Examples include Archipelago, Instinet, Chi-X, and TSX-Alpha.

Electronic Market Malfunctions and Traditional Methods:

- examples of electronic market malfunctions, such as the BATS IPO issue in 2012 and an erroneous buy order on the NYSE in 2012.
- These examples highlight potential issues with electronic systems and underscore the continued relevance of traditional methods and human oversight (like market makers monitoring orders) in preventing costly errors.

Dark Pools: Allow "institutional investors to anonymously make large trades." They have gained significant market share in the US and Canada.

- There are 50+ dark pools in the US which have captured 10-20% of volume in the US); while in Canada5+ dark pools (with 5-10% market share). Dark orders in Canada only include size and direction (NO price conditions).

A market order only executes on a dark venue if it receives price improvement over the lit market → trade execution prices in the dark market are determined by the prices in the lit market → so, spread should be tighter and prices better for buyers and sellers.

Advantages include "Hides identity of institutions and prevents front-running" and "Reduces costs (potentially 30% or more for small/mid-caps". However, they can lead to "Fragmented liquidity in individual dark pools" "partial fills or execution delays," and potential "price impact."

Crossing Networks Share many features of dark pools, being 3) "Dark," "Anonymous," and reducing the likelihood of price movement against the trade.

They electronically match "large, often institutional, orders" and use prices from other venues. Examples include ITG POSIT and INSTINET.

The Block Trade Market (The Upstairs Market): A market for "block trades," which are difficult to execute easily or inexpensively on traditional exchanges. Dealers are often used to find counterparties, a process that "Takes time" and requires signaling "no information." Initiators may provide a discount, but generally less than if the order was sent to the main market.

Sellers have alleged of information leakage in this market, specifically mentioning Morgan Stanley.

The Role of Competition:

"If costs are high or execution is ineffective, other markets are likely to emerge." The example of the "New Street market" emerging when the NYSE shut down during World War I illustrates this point.

Fragmentation: The increase in the number of trading venues (exchanges, ECNs, dark pools, etc.) has led to market fragmentation. While this "Could enhance competition" and lead to "improved prices," it also "has created opportunities for HFTs and risks for institutional traders." The NYSE's market share has significantly declined as ECNs and dark pools have gained prominence.

New exchanges like MEMX, the Long-Term Stock Exchange, and MIAX Pearl Equities are emerging, often emphasizing specific trading philosophies or low-cost structures.

The Emergence of IEX: IEX launched Oct 2013 and has been approved as an exchange in June 2016. It is presented as a response to HFTs and fragmentation. It offers "uniform delays in order execution" (a speed bump) and "No rebate3654s for providing liquidity," both of which are designed to hurt HFT strategies. It uses a "Flat fee for order execution." While there's some evidence the speed bump reduces trading costs, its ability to attract sufficient volume is a question. The story of IEX and HFT is linked to the book Flash Boys by Michael Lewis.

CH3: TRANSACTION COSTS

Rational Expectations and Information Asymmetry: The market is populated by agents who are generally forward-looking and form accurate estimates; any errors they make are random.

Regret-free prices are the outcome of rationality

Passive traders choose prices they do not subsequently regret

Ask = E (Value I Buy) & Bid = E (Value I Sell)

Trader types (4)

- **Informed traders:** "Have a good idea of asset value."
- **Uninformed (or liquidity) traders:** "Trade for reasons unrelated to value."
- **Market-maker:** An uninformed party who "Quotes prices to earn normal profits and balance inventory."
- **Noise traders:** Those who "think they know something but are wrong."

The Problem with a Single Price: A market-maker using a single price will "systematically lose to informed traders," who exploit their information advantage.

The Emergence of the Spread: To avoid being "driven out of business," market-makers "charge a bid-ask spread." This spread allows them to "recover these losses from uninformed traders."

➔ Bagehot (1973): spread is a tax on uninformed investors (due to the presence of informed traders)

➔ The greater the risk that the market-maker faces from informed traders, the wider the spread

Transaction Cost Components: Beyond the bid-ask spread, transaction costs also include (3) "Commissions paid to brokers," "Opportunity costs," and "Price impact costs."

Importance of Transaction Costs: They "worsen the prices paid or received by investors."

- They "affect the prices that investors are willing to pay."
- They "affect market quality," influencing (4)"Trading activity," "Liquidity," "Volatility," and "Market efficiency."

FOTO p36

TRANSACTION COSTS AFFECT PRICES

		Year 0			Year 1			Net Return
Stock 1	Ask		100.5			120.6		
E(r)=20%	Value	100			120			18.8
Spread=1%	Bid		99.5			119.4		
Stock 2	Ask		102.5			123		
E(r)=20%	Value	100			120			14.1
Spread=5%	Bid		97.5			117		

- Which stock would you rather buy?
- What will happen to prices and expected returns as a result?
- Can you think of other ways of handling this problem?

1.Stock 1, because it delivers a higher net return (18.8%) versus Stock 2 (14.1%) — *despite both having the same expected gross return of 20%*.
This is due to lower transaction costs (1% spread vs. 5%).

2. Investors prefer low-spread stocks → higher demand for Stock 1. That increases Stock 1's price and lowers its expected return.
   - Stock 2 must offer a higher gross return to compensate for its high spread. So:
   - High-spread stocks trade at lower prices
   - Expected returns adjust to include transaction costs

This is consistent with findings from Amihud & Mendelson (1986): investors require a liquidity premium for less liquid stocks.

3.

Market structure reforms: e.g. tighter spreads via competition or electronic trading.
Limit orders: to avoid crossing the full spread.
Using algorithms: to slice large trades and reduce price impact.
   - Improving transparency: better price discovery can reduce spreads

Policy incentives: tax advantages for trading in more liquid markets.

Transaction Costs and Prices/Returns: "Investors demand higher returns for securities with higher trading costs ⇒ Prices for such securities are lower." This is supported by academic work (Amihud and Mendelson (JFE 1986), Brennan and Subrahmanyam (JFE 1996), Pastor and Stambaugh (JPE 2003)).

Transaction Costs affect Market Quality:
Market quality reflects the speed and accuracy with which information is impounded in prices
Higher trading costs lead to 1)lower volumes, 2) more sluggish price adjustment, and 3) higher volatility -> and thus to lower market quality."

Transaction cost measures:
Bid-ask spread: The difference between the ask and bid. The "relative or proportional spread divides the raw spread by the quote midpoint" .
The relative spread is useful because it's a cost that can be directly compared to the gross returns

Pre-specified benchmarks: Measure the trade price relative to a benchmark

PI_cost = (TPR – P*) * volume * trade_sign note: trade sign= +1 buy, and -1 for sell (and ensures that PI_cost is usually positive)

The Lee-Ready Algorithm
An investor knows whether their trade was a buy or sell, and thus knows Trade_sig
To sign trades in public databases (as on the previous slides), use the following algorithm:
Compare TPR to the more recent bid-ask quote

- TPR closer to bid, trade is a sell (if closer to ask … trade is a buy)

TPR is = to average of the bid ans ask, compare TPR with the previous TPR

- If TPR > previous TPR -> trade is a buy / if TPR < previous TPR -> trade is a sell

Possible Price benchmark:
including Effective Spread, Realized Spread, Average Price (like VWAP), and Implementation Shortfall.
Effective Spread: most recent quote midpoint
Realized Spread: future quote midpoint - quote *after* the trade.
Effective vs. Realized Spread: "The difference between the effective and realized spreads can be thought of as dealer losses." This difference "reflects the revision in the dealer's estimate of value as a result of the trade (back to rational expectations)."
Average Price: VWAP (Volume Weighted Average Price) / average of open, high, low and close prices
Implementation Shortfall: Use quote midpoint at the time the order was placed

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Benchmark is the midpoint *at the time of* the trade

$$Eff\_spr = 2 \times \left(TPR - \frac{Bid_{trade} + Ask_{trade}}{2} \right) \times Trade\_sign$$

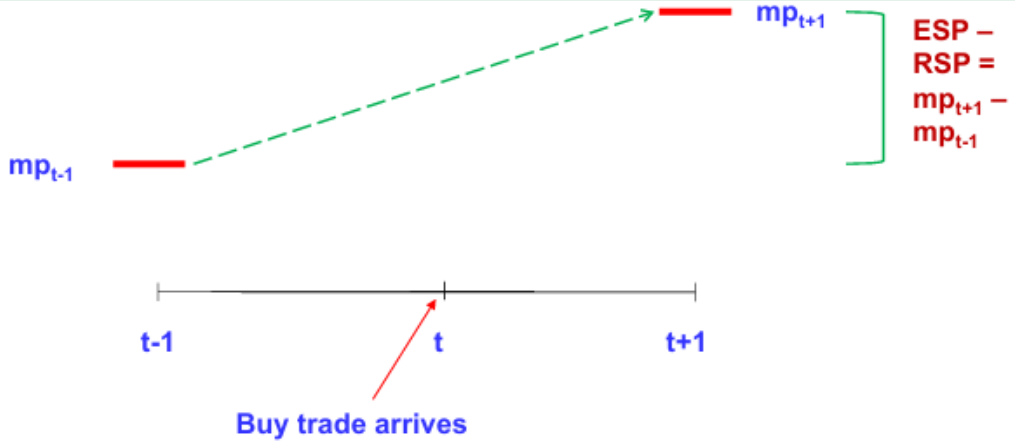
- Eff_spr measures the cost of a round trip trade assuming that the quote does not change
- If a trade occurs at the bid or ask, Eff_spr = raw spread
- If the trade occurs within the spread, Eff_spr < raw spread
  - *Price improvement*
- If the trade occurs outside the spread, Eff_spr > raw spread
  - This usually happens in the case of large trades
- Commonly used benchmark, because quotes are available

Benchmark is the midpoint *after* the trade

$$Real\_spr = 2 \times \left(TPR - \frac{Bid_{post} + Ask_{post}}{2} \right) \times Trade\_sign$$

- If the quote does not change after the trade, $Real\_spr = Eff\_spr$
- Often, the quote *does* change, and $Real\_spr < Eff\_spr$
  - Both the bid and the ask tend to increase after buys and to drop after sells (especially if the trade is large)
- The difference between the effective and realized spreads can be thought of as dealer losses (*see the next slide*)
  - E.g. the dealer sells to an investor and the price subsequently rises

ESP, RSP AND DEALER LEARNING



The difference between the effective and realized spreads reflects the revision in the dealer's estimate of value as a result of the trade (back to *rational expectations*)

$$VWAP_t = \frac{\sum_{i=1}^{N_t} TPR_i \times Volume_i}{\sum_{i=1}^{N_t} Volume_i}$$

N_t is the number of trades on day t

- Set P^* equal to $VWAP_t$
- $VWAP_t$ is an estimate of the average price on day t
  - You are weighting the prices of all the trades on day t by the associated volumes to get the average price
- Similarly you can use the average of some prices
  - E.g. the average of the opening and closing prices
  - Or the average of the open, high, low and close

$$Imp\_Sh = 2 \times \left(TPR - \frac{Bid_0 + Ask_0}{2} \right) \times Trade\_sign$$

Benchmark is the midpoint *at the time the order is placed*

- The benchmark is the price at the time the investor decided to trade
- It truly is pre-determined
- This has advantages relative to the other measures
  - Captures the effects of split orders
  - Difficult to "game"

Separating Liquidity and Information Effects: Price changes or the spread can be decomposed into components reflecting:

- Liquidity provision: Costs for providing immediacy, resulting in price changes that are "reversed."
- Adverse selection: Costs due to information asymmetry with informed investors, resulting in price changes that are "permanent."

Hasbrouck Measure: A method to identify the "adverse selection component" by examining the "permanent effect of xt (signed volume) on price." It involves regressing unexpected order flow on lagged order flow and price changes, and then relating price changes to concurrent and lagged unexpected order flow.

- The measure of adverse selection is directly related to l0 + l1 (higher l0+l1 -> higher adverse selection

Inventory effect

- buy trade depletes the dealer's inventory and potentially conveys positive news AND by raising the ask: discourage buys and raising the sells: encourage sells -> bring dealer back to desired inventory position

Information: if only inventory effect: bid/ask/midpoint return to their pre-trade levels (once dealer has recovered the lost shares)…BUT if dealer conveys any information: they will remain above their pre-trade values

Glosten-Harris Measure: Separates price changes into "transitory and permanent components" using intraday data and regression analysis. It includes components for the transitory effect (c0 and c1) and the adverse selection component (z0 and z1).

Determinants of Transaction Costs

Cross sectional determinants: factors that explain why transaction costs tend to be higher for some stocks than others

- Trading volume (lower costs with higher volume)
- return volatility (higher costs with higher volatility),
- price (proportionately lower for higher-price stocks)
- market cap (higher for smaller firms)
- analyst following (higher for fewer analysts).

Time-series Determinants: factors that explain why transaction costs tend to be higher for some stocks than others

- Up versus down markets (lower costs in positive markets)
- OIB (Order Imbalance - increases as order flow is more unbalanced)
- volume (higher after volume increases, signaling information)
- volatility (higher when returns are more volatile)
- information events (higher around earnings announcements)

CHAPTER4: LIQUIDITY

Liquidity: ability to trade quickly and at low cost

- Important: traders (better terms of trade), markets (attracts more traders), regulators (lower vola), firms (affects their cost of capital – direct application of the Amihud and Mendelson idea)
- Liquidity is greater for smaller orders and depends on trading activity of the stock

4 liquidity dimensions

1. Immediacy (speed with which a trade of a given size is completed): liquid -> greater
2. Depth (size): liquid -> larger trades
3. Width/breadth (cost): includes bis/ask spread & commissions: liquid -> lower
4. Resiliency (how quickly prices return to former level after large imbalances) liquid -> greater

Conflicting: 1/2/3 are conflicting goals:

- Increase size, longer or cost more (increase 2 -> up: 1, 3)
- trade immediately, pay more for execution or trade smaller (1-> up:2,3)

greater liquidity:

- for uninformed than informed traders
- for assets with known value with greater certainty
- market is open
- assets traded by larger number of investors
- position is opposite that of most other traders (ie: buying in a declining market)

Liquidity providers: hope make money – buy low and sell high

1. **Passive liquidity suppliers** (not trade until impatient traders comes)
2. **Pre-committed liquidity suppliers** (desired position with no hurry)

1.Passive liquidity suppliers

1. **Dealers**: provide immediacy; avoid large inventory positions (try to set prices to attract balanced order flow); knowledge of market conditions, trade small sizes, charge bid ask spread (compensation for liquidity and bearing adverse selection risk)

2. **Floor brokers**: know well market, less common now (trading floor disappears)

3. **Block dealers**: offer liquidity to traders that want to trade in large positions (or blocks); want to trade with uninformed traders, trade slowly by breaking up large trades and placing blocks with other customers; earn a small liquidity premium

4. **Value traders**: make markets resilient (if price increases temporarily, value traders sell), trade with dealers (buy or sell their unwanted inventory)

2.Pre-committed liquidity providers

1. **Limit orders**: aggressive suppliers of liquidity; place limit order at slightly better price than the dealer's price; trade small size (not want to expose to large orders & lose to quote matchers and informed traders)

2. **Arbitrageurs**: exploit mispricing across markets; link liquidity demands across markets; need to trade quickly (before prices adjust); make markets efficient

Measuring liquidity

- **microstructure based method:** measure individual trade effects, data intensive
- **method on aggregated data**: lose some precision yet not data intensive

Price reversal – 2 explanations

1) **bid-ask bounce**: trade prices bouncing between the bid and the ask

   EX: Assuming constant bid and ask prices, a non-zero price change will be reversed (e.g. t+2 → t+3 → t+4) or be followed by no price change (e.g. t → t+1 →t+2) ⇒ the covariance in price changes cannot be positive

2) **price pressure**: prices rise due to buying pressure and decline later -> compensated the sellers who provide liquidity

   EX: buying or selling in an illiquid market causes prices to overshoot and then correct

The tendency for reversal is statistically measured by the **autocovariance** in price changes or returns

$Cov(\Delta Pt, \Delta Pt+1) < 0$ means that there are reversals and is a sign of price pressure

The autocovariance in returns actually is a measure of trading costs under certain assumptions

Trad_cost = 2 sqrt(- $Cov(\Delta Pt, \Delta Pt+1)$

- If prices reverse, this will be positive (if they do not reverse -> not defined)
- It reflects the bid-ask bounce effect

The covariance of price changes measures liquidity but is harder to compare across stocks than the unitless autocorrelation (correlation of price changes)

Corr ($\Delta Pt, \Delta Pt+1$) = cov ($\Delta Pt, \Delta Pt+1$) / var (ΔPt)

The Amihud illiquidity ratio: IRi,d = I Ri,d) / Volumei,d -> higher values imply lower liquidity

Pro: Lots of data (for past 10+years); Cons: not precisely estimated as Hasbrouck or Glosten-Harris

Pastor-Stambaugh's measure

- Captures liquidity via the following regression

$$R_{i,d+1} = \theta_i + \gamma_i sign(R_{i,d} - M_d) Volume_{i,d} + \varepsilon_{i,d+1}$$

- $R_{i,d+1}$ is the close-close return for stock i on day $d+1$
- $R_{i,d}$ and M_d are the close-close returns for stock i and the market on day d
  - $\text{sign}(R_{i,d} - M_d)$ indicates whether the stock did better or worse than the market on day d
- $Volume_{i,d}$ is the dollar volume for stock i on day d

The variable sign(Ri,d– Md)Volumei,d is a rough measure of order flow for stock i on day d

- If >0 day's volume likely to reflect net buying pressure; otherwise selling pressure
- Due to illiquidity, expect to see subsequent return reversals: yi <0

If volume informed: majority of trading activity is driven by trader who have superior information.

1) Price adjust faster – market becomes more efficient
2) Widen bid-ask spread – market markers (liquidity providers) face a higher risk of trasding against informed traders
3) Uninformed traders may withdraw – this can reduce market depth and liquidity in short term

Proportion of zero returns

The zero proportion (or %Zero) is the fraction of trading days within a specific period during which a stock has a return of exactly zero.

- and a higher proportion indicates lower liquidity, as it suggests the stock was not actively traded on those days.

Possible liquidity-based strategy

- Possible liquidity-based strategies include sorting stocks by liquidity measures—such as the Amihud ratio or %Zero—and investing only in the most liquid or most illiquid stocks to potentially capture a **liquidity premium** or reduce **transaction costs**.

- A well-designed liquidity-based strategy can enhance the **traditional momentum (MOM)** approach—typically long winners and short losers—by incorporating an additional liquidity filter (e.g., Amihud or %Zero); if MOM returns vary with liquidity, investors may capture an **illiquidity premium**, while if not, they may prefer to focus only on **more liquid stocks** to minimize trading costs.

How does illiquidity appears:

- Large price moves associated with heavy volumes
- Also, there are larger reversals subsequent to the heavy volume periods ->trading has significant liquidity-driven price effects

Why illiquidity appears:

- **Buy/sell orders then to occur together** (selling for one stock there tends to be selling for other stocks: especially if stocks in a basket -> entire market becomes illiquid)
- **Orders are positively autocorrelated** (sells tend to be followed by more sells and buys by more buys) -> order imbalances accumulated and a stock becomes less liquid

- The Tesla episode on September 28, 2018—when the stock dropped from $308 to $265 on high volume and then rebounded to $311 on the next trading day—illustrates how illiquidity can lead to large price moves followed by sharp reversals, highlighting the impact of heavy trading pressure on prices

- Also, **Futures expiration days** and **index addition events** often lead to **temporary illiquidity** due to heavy, coordinated trading—such as the unwinding of arbitrage positions or index fund rebalancing—which causes **volume spikes, price volatility, and subsequent reversals**

- In April 2018, **market depth shrank**, leading to **reduced trading volumes and increased price volatility**, demonstrating how lower liquidity can amplify market instability during stressed conditions

Liquidity comovements

- market-wide liquidity changes over time—sometimes most stocks are easy to trade, and other times they're all hard to trade.
- Liquidity tends to move together for stocks: liquidity for currencies tend to move together, stock and bond market liquidity moves together, stock and FX liquidity moves together
- Increases when market is down by a lot; and also when market is volatile

Liquidity comovements and collateral effects

In down markets, stocks tend to face heavy selling pressure and have large negative returns → dealers accumulate inventory which is dropping in value → increased dealers' borrowing costs SO they reduce liquidty → this happens across dealers so comovement in liquidity increased in down market

SAME WAY: In down markets, stocks fall and dealers get stuck with losing inventory, making their borrowing more expensive, so they reduce trading; since all dealers do this, **liquidity drops together**—but later, as prices recover, **stocks often bounce back**, rewarding dealers for holding through the illiquid period.

Liquidity crises

Liquidity crises start with some traders selling after losses, triggering more selling and falling prices, which leads to margin calls and forced sales—creating a downward spiral that ends only when enough investors step in to buy

The Greek crisis

During the Greek crisis, bond yields swung wildly and panic selling caused **liquidity to vanish**, with **huge bid-ask spreads**—highlighting how crises impact both **trading costs (spreads)** and **price reversals** (two relevant dimensions of liquidity)

CHAPTER 7: INSTITUTIONAL AND INDIVIDUAL TRADES

Institutional investors, including mutual funds, pension funds, hedge funds, and sovereign wealth funds, control a vast amount of global assets under management (**AUM**). Mutual funds alone are estimated to hold $70 trillion in AUM as of Q2 2024.

Influence on prices: institutional trading, particularly by aggressive and levered investors like hedge funds, can significantly move prices (ie futures markets)

Passive Investing Effects:

• **Increasing Ownership:** Passive investors (ETFs, mutual funds) hold increasing percentages of firms, particularly mid-caps.

• **Reduced Liquidity and Increased Volatility:** As these shares tend to remain in buy-and-hold portfolios, the free float declines, "reducing liquidity and increasing volatility."

Asset correlations

- once they add new assets to portfolio, they tend to buy (sell) these assets at the same time that they buy (sell) other assets in their portfolios -> enhances correlation between the existing assets and the new assets.
- Trading increase the return correlation between assets - when a stock is added to a major index, its return comovement with the index increases substantially

How do institutions trade?

Keim and Madhavan (JFE 1995) studied the trading patterns for 21 institutions (1991-1993) and divided into value, technical and index (with value being the most patient traders).Indeed, the order fill speed was longer for value than technical or index and also gas lower market orders.

Institutions trade differently based on strategy: **value investors are the most patient**, taking around **2.3 days to complete buy orders**, while **technical and index traders act faster**; overall, trades are large (especially mean sell order) and are mostly done through **market orders**, especially by technical traders who prioritize **speed and immediacy**

- **The Tech Bubble:** Hedge funds played a role in the tech bubble, not by fighting it, but by "riding the wave." They over-weighted tech stocks before the peak and increased their holdings at a faster pace than other investors as prices rose. As prices fell, they shrank their positions. The behavior of prominent hedge funds like Soros (who rode the wave) and Tiger (who liquidated after outflows) illustrates the different strategies and pressures faced by these institutions. Despite contributing to the bubble's growth, the drop in hedge fund holdings of individual tech stocks after their price peaks "suggests that hedge funds were selling overpriced shares."

Hed

Institutional Herding:

ge funds knew this was a bubble and could partially predict when it would end -> So they knew when to buy and sell: this allowed them to ride the bubble and they were able to earn abnormal returns

Evidence of Herding: Studies show evidence of mutual fund herding, particularly in:

- growth stocks, small stocks (especially on the sell side) - This also suggests that funds herd more when less precise information is available & also that the buy-sell asymmetry is consistent with fund aversion to loser stocks

- More herding on buy (sell) side for stocks with high (low) recent returns - consistent with return chasing / momentum
- Across all stocks, 3%" herding is observed, meaning "if 100 funds trade a stock, there are 3 more funds on the same side of the market."
- For growth stocks (3-4%) vs value stocks (1-2%) – this is consistent with greater herding for stocks with less precise information.

Herding and Returns: Stocks bought by herds tend to outperform stocks sold by herds, suggesting herding may be associated with private information and is not necessarily destabilizing as "Price changes appear permanent."

Potential Questionable Institutional Practices:

- **Window Dressing:** Institutions may buy good performers and sell poor performers at the end of a reporting period "To create the illusion that they have held these stocks all along."
- **Portfolio Pumping:** Institutions might buy stocks, especially those they hold in large quantities, at the end of the quarter to inflate portfolio values.
- **Challenges in Bond Trading:** The increasing institutional ownership of the corporate bond market, coupled with declining volumes and shrinking dealer inventories, raises concerns about liquidity and trade execution for institutions

EX: Suppose you want to execute a large trade – when/how/where

Trading strategy:

- You want to trade without alerting the rest of the market (Stealth trading)
- This involves in trying to: split orders, relatively rapid execution (to minimize market risk)

When:

- Look at past patters to determine optimal trading
- Intraday trading volume is U-shaped (opening and closing 30/60 minutes might be the best
- But these are periods when other traders are active, so there is the risk of illiquidity

How

- Small trades (less impact ALA size < quoted depth
- Limit or market order? Depends on urgency (and costs)

Where

- Market with the highest liquidity (might choose the less liquid market if the price adjustment occurs ar different speeds)

High frequency and algorithmic trading

- **Prevalence:** Algorithmic trading, the use of computer algorithms in order execution, accounts for a significant portion of trading activity, with high frequency trading (HFT), a subset of algo trading focused on rapid execution, accounting for over 50% of recent US volume.
- **Sophistication and Speed:** Algo trading is becoming highly sophisticated, with HFT firms investing heavily in technology to reduce latency, even at the millisecond level, to exploit price and information gaps.

Pros and Cons of HFT:

- **Pros**: Can "help make markets more efficient" and may provide liquidity, particularly in volatile markets.
- **Cons**: Effects on liquidity are ambiguous and HFT firms have "no obligation to stay in the market at all times" (e.g., the flash crash). Questionable practices like 'bait and switch' and 'pinging' raise concerns about market manipulation.

- **Risk**: In events like the Flash Crash, HFTs can vanish, worsening volatility.

Bait and Switch: HFTs place a **fake attractive limit order** to lure institutional investors; Once interest is detected, they **cancel it** and replace it with a **worse price**, using **speed advantage**

Cross-Market Exploitation

- HFTs exploit institutional routing preferences (e.g. best rebates).
- They send **bait orders to fast markets**, and **predatory orders to slower ones**.

Pinging

- HFTs **probe markets with small orders** to detect hidden (iceberg) institutional orders.
- If all small orders get filled, they know there's more behind and act accordingly.

Banging the Beehive

- Create artificial volatility, often before news releases
- HFTs trigger stop orders just before data hits, **move the price**, then profit from **fast buying/selling** amid volatility.
- Example: **Aug 16, 2012**, natural gas prices dropped before bullish news, then spiked and fell again—**manipulated by HFTs**.

Is Stock Algo Trading Good or Bad?

- **Good**: Algo trading focuses on **large, liquid stocks**; benefits: lower spread, better price discovery especially trades <5000 shares (Price discovery due to trades declines, i.e. quotes become more informative)
- **Bad**: A $1.8B algorithmic trade in **E-mini S&P futures** caused **massive short-term market impact** → Shows algos **can move markets sharply** if not well-designed or coordinated.

Is FX Algo Trading Good or Bad?

Mostly good: does not raise volatility, adds liquidity after macro news (but less important in price discovery han non-algo trading)

Individual trading

- Often trade irrational (outcome of psychological forces or behavioral biases) -> lose money (occasionally can cause **market instability**, **bubbles**, or **crashes** when trading collectively)
- Individual trading activity has increased in recent years (during Covid).

Common biases in individual investor thinking:

Heuristics: Using rules of thumb to simplify decision-making.

Overconfidence: Overestimating investment abilities, leading to excessive trading, particularly in risky assets like crypto, options, and penny stocks. Overconfident investors are also more likely to sell after a market drop.

Disposition Effect: Reluctance to realize losses on investments while being quick to sell winners. This is linked to the shape of the utility function and investors' willingness to gamble on losers recovering.

Conservatism: Being slow to react to changing situations, potentially explaining under-reaction to news.

Representativeness: Overweighting the recent past and ignoring a longer, more representative sample. This is the opposite of conservatism.

Contrast Effects: Recent experiences shaping reactions to news (The reaction to earnings announcements that follow a large positive earnings surprise from a big firm is less positive)

Attention Effects: Investors have limited attention, which can be a problem for complex information and contributes to phenomena like post-earnings announcement drift on busy news days.
Under-Reaction Explained: Under-reaction, a behavioral explanation for Momentum and PEAD, occurs because investors underweight signals (like past returns or earnings) due to being overconfident about their priors.

➔ This leads to incomplete price adjustment initially, causing drift over time. This drift is exacerbated when information uncertainty is high.

Individual Trading Patterns:

- **Excessive Trading:** Individual investors "trade too much," leading to lower returns than index returns. The stocks they buy also tend to underperform the stocks they sell.
- **Skewness Preference:** Individuals chase "lottery stocks" with negative average returns but the potential for large gains, suggesting they misestimate tail probabilities. This is seen in the prevalence of buying penny stocks and short-term options.
- **Gender Differences:** Men trade more frequently and exhibit greater overconfidence than women, which negatively impacts their returns. Women tend to diversify more. Evidence from GameStop trading during the peak shows a high proportion of male, millennial traders, with most experiencing losses.
- **Experience:** As experience increases, returns improve slightly, and investors learn about their abilities and the size of the disposition effect decreases.
- **Weather:** Stock prices show a negative correlation with New York cloud cover, with a potential explanation linked to trader mood. This effect is reinforced by international evidence and linked to Seasonal Affective Disorder (SAD), suggesting prices may be lower in winter in the Northern hemisphere and vice versa due to increased risk aversion.
- **Comovement in trading**

Selling decision: Individuals seem to be unwilling to sell stocks that have lost money (rather sell winners and this imposes taxes) → **the disposition effect** can explain this result (explanation based on the shape of utility function: concave for gains and convex for losses)

- investors are willing to gamble that losers will recover
- they are unwilling to gamble with winners

Buying decision: individuals tend to buy big winners and big losers (also stocks in news and stocks with high volume) -> explanation: attract their attention (investors are unwilling to invest time in gathering information of thousands of stocks – ie: Robinhood evidence)

➔ appear to chase lottery stocks (ie: US OTC market: penny stocks with some big success but mostly failures) → **distribution have negative means but long right tails** (tend to buy stocks with low prices and high idiosyncratic volatility and skewness – which investors overpay for such stocks – explaining the negative average returns)

Option trading

- Trading has exploded in short-term options (ie: with less than one week to maturity
- Options trading has exploded in short-term contracts, especially ODTE options that expire daily; despite being cheap, they have high bid-ask spreads, often lose money, and appear more like gambling than hedging

Men: trade more (45% more than women – due to overconfidence) -> men's return reduced b y 2.65% -> women diversify more – Fidelity

Comovement in Returns and Trading:
Observed Comovement: Returns for various asset classes and stock categories tend to co-move. Returns for U.S. traded country ETFs co-move as much with U.S. market returns as with home country returns

- Small cap / large cap returns co-move
- Value / growth stocks returns co-move
- S&P index constituents returns co-move
- Stocks switching from NASDAQ to the NYSE see changes in their return co-movement

Explanations for Comovement:

- **Efficient Markets View:** Comovement is driven by news about fundamentals (cash flows or discount rates).
- **Alternative View:** Comovement is due to "correlated noise trader sentiment," also known as 'excess comovement'. "Word-of-mouth" effects among proximate investors or mutual funds can also contribute.
- **Institutional Herding and Comovement:** Even sophisticated investors can be susceptible to correlated sentiment and herding, as evidenced by losses incurred by prominent investors in FTX.
- A quote from Sam Bankman-Fried highlights how venture capitalists can be influenced by peer chatter and FOMO, leading to investment decisions that may not be fully supported by traditional valuation models.
- **Trading in Baskets:** Investors often trade stocks in "baskets," "habitats," or "categories" (e.g., small cap vs. large cap, blue chips), which simplifies portfolio allocation and is done in a coordinated fashion due to correlated sentiment. Arbitrageurs may not fully undo these effects →leading to comovement in returns within these categories.

FINE CHAPTER 7

Topic 08: Speculation

This section focuses on identifying and exploiting profit opportunities in financial markets and the risks involved.

- **Profit Opportunities**
  - Two main types: **Arbitrage** (riskless profit) and **Alpha** (risky mispricing).
  - **Market efficiency** states that no profit opportunities exist (no arbitrage, no alpha). Don't confuse arbitrage and alpha; "risk arbitrage" is an oxymoron.
  - **Disequilibrium Profits**: Arise rarely, such as a stock trading in two locations with different adjustment speeds or interest rate changes affecting futures-spot prices. You should pounce on these, but recognize competition from fast traders. Dangers include speed of transacting, trading costs, depth, and risks.
  - **Alpha Opportunities**: If arbitrage is mostly absent, opportunities exist in exploiting risky mispricing
- **Benjamin Graham on the Dangers in Speculation**
  - Graham's warnings are mainly for retail investors but relevant for professionals.
  - Don't speculate seriously without proper knowledge and skill.
  - If trying speculation, use a small, separate fund and **never mingle speculative and investment operations.**
  - Do not get greedy. As André Kostolany said, you get poor quickly by trying to get rich quickly. Look for **singles, not home runs**.
- **Why Do Profit Opportunities Arise?**
  - **Actions of retail investors**: Display psychological biases that affect decisions and prices. If they become more important, their price effects increase.
  - **Actions of institutional investors**: Run by individuals (less susceptible to biases) but cater to individual investors. Tend to crowd into the same assets, potentially creating price pressure.
- **Exploiting Mispricing (Alpha)**
  - If an asset i is mispriced, form a portfolio of one share of asset i and $\delta_{i,h}$ shares of a hedge asset h. Asset h could be the market or another stock/portfolio.
  - The goal is to **minimize portfolio risk** by choosing the optimal hedge ratio $\delta_{i,h}$.
  - The hedge ratio $\delta_{i,h}$ is the **negative of the slope coefficient ($\beta_{i,h}$)** from a regression of $R_{i,t}$ on $R_{h,t}$. If h is the market, $\delta_{i,h} = -\beta_{i,m}$.
  - You pay attention to the slope coefficient and the R^2 from these regressions.
  - **Effectiveness of the Hedge**: The higher the **correlation coefficient ($\rho_{i,h}$)** between the mispriced asset and the hedge, the better the hedge and the greater the reduction in portfolio risk. Variance of the hedged portfolio = $Var(R_{i,t}) * (1 - \rho_{i,h}^2)$.
  - **Example (Google/Apple):** Believing GOOG is underpriced, you buy GOOG and short APPL to eliminate market and industry risk. Scatter plots and regressions show the statistical association between their returns.
- **Costs and Risks in Speculation**
  - **Fundamental Risk:** Even with hedging, the R^2 from regressions is never high (not much above 40%) because substitutes are imperfect. Hedged portfolios containing mispriced assets are still very risky. Also includes the need to find shares to short. Forming a portfolio of several mispriced assets/hedges should help, but finding enough mispriced assets is a challenge.
  - **Event Risk**: Individual events can be risky. Example: Foot Locker's addition to the S&P 500 caused a price increase on the announcement date, followed by large negative abnormal returns in the next few days. The lesson is you need to participate in each event.

- **Noise Trader Risk**: Noise trader sentiment is **unpredictable**. A mispriced asset can become even more mispriced in the short term. Rational arbitrageurs with finite horizons may have to liquidate positions at a loss (e.g., margin calls, covering shorts). As Keynes is attributed, "Markets can stay irrational longer than you can stay solvent".
- **Evidence of Noise Trader Risk ('Siamese Twins'):** Pairs of shares that are claims on the same underlying cash flows but trade separately (e.g., Royal Dutch/Shell) should have a constant price ratio. Deviations were large and persistent for years, showing that mispricing can persist and arbitrageurs betting on convergence faced significant risk. LTCM lost money on this trade. Local sentiment might contribute to discrepancy.
- **Evidence of Arbitrage Costs ('Carve-outs'):** When 3Com spun off Palm, the market valued the remaining 3Com negatively based on the relative prices of Palm and 3Com shares. An arbitrage opportunity existed: short Palm and buy 3Com. The problem in implementing this was that Palm shares were not available to short or had high borrowing costs.
- **Arbitrage Costs**: Costs faced in exploiting mispricing. Includes trading costs (spreads, price impact, commissions) for all trades and **borrowing costs** for short positions. Borrowing costs are usually small but can be high or stocks unavailable for shorting.
- Also, investors need to be aware of mispricing and have the ability to trade (e.g., institutions might be restricted by prudent man rules).
- **Anomalies and Firm Size**: Anomalies (like value strategies) are stronger in smaller stocks. This could be because small stocks are neglected or have higher trading and arbitrage costs.
- **Trading Against Noise Traders:** It's best to use **your own capital** to reduce the risk of panic withdrawals forcing liquidation. Aggressiveness in trading depends on the nature of the mispricing; be more aggressive if similar events corrected quickly before.

- **Prediction and Position Building**
  - Prediction is crucial for making money. Examples include predicting based on market patterns (like NK225 and S&P 500) or lead-lag relationships (big stocks predicting small stocks).
  - **Predictive Regressions:** Use regressions like $R_{i,t} = \alpha_i + \beta_i X_{t-k} + e_{i,t}$ to predict asset returns ($R_{i,t}$) based on predictor variables (X_{t-k}). X could be interest rates, yield differentials, portfolio returns, sentiment proxies, etc..
  - Look at the **significance of the slope coefficient (βi)** (t-stat > 2).
  - **The R^2 is very important**, showing the % of variation explained. Adjusted R^2 is better. R^2 is almost always low, rarely above 5%, which is a major issue. Look at **out-of-sample** R^2 for robustness.
  - **Position Building**: If you want to buy a large amount of a stock but can't do it immediately (due to market impact, etc.), you can use futures to hedge.
  - **Example**: To buy $1M of stock j with β=1.5, buy $1.5M in index futures. If the market rises before you buy the stock, the stock price increases, costing more to buy the shares. However, your gain on the futures position offsets this additional cost, assuming the market model relationship holds. This works if the R^2 of the stock's return against the market is high

Topic 10: Technical Analysis

This section explores forecasting prices based on past market data and common technical rules.

- **What is Technical Analysis?**
  - Forecasting prices using past information, often past prices, volume, or order flow.
  - Exploiting patterns in the data.
  - Philosophy: Technical analysts believe patterns are repeated. They usually believe the market is inefficient or that large information gaps lead to imitation/herding. Arbitrage costs or risks might explain apparent profit opportunities.
  - Widely used, especially at horizons less than 1 week (dominates fundamental analysis). It's often a quantitative, computer-intensive approach involving trial-and-error to find patterns.
- **Chartists vs. Technical Analysts**
  - **Chartists**: Use **graphs** to visually detect patterns. Subjective, relying on skill, experience, and potentially emotions.
  - **Technical Analysts**: Base positions on **mechanical rules**. Objective, disciplined, removes emotion, but sacrifices unique perspective.
  - Technical analysis includes charting, but using rules is more common.
- **Charting Concepts**
  - Identify trends: Uptrend lines below troughs, downtrend lines above peaks. Continued adherence confirms trend.
  - Resistance levels (peaks) and Support levels (troughs) over a window. Breaking above resistance suggests uptrend continuation; failing suggests reversal.
  - **Head and Shoulders pattern**: If the price falls below an upward-sloping neckline, it signals a trend reversal (opposite for downward-sloping neckline).
  - **Candlesticks**: Show open, high, low, close for a period. White box (close > open), black box (open > close). Trends in these series can imply sentiment (e.g., white bar above previous implies bullishness). Complicated strategies exist.

- **Common Technical Rules**
  - **Moving Average Models (SMA, EWMA):**
    - **Simple Moving Average (SMA):** Compares price to a short-run MA, or a short-run MA to a long-run MA. e.g., 25-day MA.
    - **SMA Logic**: A buy signal (price crosses above previous day's SMA, then stays above current SMA) indicates sentiment has turned (vice versa for sell). Also comparing two SMAs (e.g., 5-day vs. 25-day).
    - **Longer-Term SMA**: Golden Cross (SMA(50) crosses SMA(200) from below, often with high volume, sometimes requires both trending up) is a buy signal. Death Cross (SMA(50) intersects SMA(200) from above) is a sell signal.
    - **SMA Performance**: MA(200) on DJIA shows varied historical performance vs. buy-and-hold. Possible explanations: pattern discovered, early outperformance was a fluke.
    - **Alternative View:** SMA can be seen as a contrarian indicator; large deviations might imply corrections rather than momentum.
    - **SMA Advantages:** Simple, intuitive, smooths noise.
    - **SMA Disadvantages**: Late reactions, might not profit if patterns are short-lived (requires lots of trading), choice of MA period matters.
    - **Exponentially Weighted Moving Average (EWMA):** Weights recent values more heavily ($\lambda < 1$) compared to SMA's equal weighting. Calculated as $EWMA_t = \lambda P_t +$

(1-λ)EWMAt-1. Involves a decaying weighting sequence. Usually truncated (e.g., N=25 lags), with λ often set to 2/N.

- **Bollinger Bands:** Calculated as SMA ± dσ (SMA is the simple moving average, σ is standard deviation of prices, d is a multiplier, typically 2 for 25 days or 2.5 for 50).
  - **Using Bollinger Bands**: If the price moves outside the upper band, go short; outside the lower band, buy. Logic is **reversion to the mean**. Contracting/expanding bands and price moving outside can signal price continuation.
- **Filter Rules**: Define trading based on price movements relative to local extrema.
  - **Momentum Strategies**: An x% filter rule: Buy if price rises x% above a recent minimum, hold until it falls x% from a new maximum, then liquidate and go short, and so on. Local maxima/minima are over a fixed window (e.g., 1-5 days). Filter and window values found via search. Filter separates noise from trend.
  - **Momentum Logic**: Large declines (increases) are followed by further declines (increases). Possible explanation: **under-reaction**; investors don't fully understand news, leading to partial price adjustment. Smaller filter means earlier trading but higher false signal risk. Use filter that yields highest profit.
  - **Contrarian Strategies**: Large declines (increases) followed by large increases (declines). Possible explanation: **over-reaction**; investors react too strongly, initial adjustment is excessive, subsequent correction leads to reversals. Tends to hold at short (1 day/week) or long (≥ 1 year) horizons.
- **Relative Strength Index (RSI):** Computed as 100 - (100 / (1 + RS)), where RS = U/D, U is average price increases, D is average price declines over a window (e.g., 14 days).
  - Normally 30 ≤ RSI ≤ 70. Values > 70 sometimes seen as a **buying opportunity** (momentum), but also as a **contrarian indicator** (expected decline after high value). Example: NK 225 RSI of 93 in Nov 2017 led some traders to expect decline.
  - Look for **divergence** between RSI and price trends. If RSI rises but price falls, it's a buy signal (expect price to follow RSI). If RSI falls but price rises, it's a sell signal.
- **Long-Term Reversals**: Stocks doing poorly (well) over 3-5 years tend to do well (poorly) over the next 3-5 years. This is a basis for **value investing**. "When there is blood in the streets, jump in!".

- **Other Predictors of Returns**
  - **Calendar Effects:** Weekend effect (low returns Fri close to Mon close), Turn-of-the-year effect (stocks, esp. small, do well Jan, bad Dec), September effect (worst month for US stocks). These contradict market efficiency. Weekend/Jan effects might have weakened, Sept effect persisted recently.
  - **Stock Volume**: Momentum strength varies with volume. High volume winners outperform high volume losers. Low volume winners outperform high volume losers. High volume winners can underperform low volume losers. High volume stocks may be overpriced ("glamor"), low volume stocks underpriced ("neglected").
  - **Order Imbalance (OIB):** Stocks with positive OIB (buying pressure) underperform those with negative OIB. Explanation: **price pressure**. Buying pressure temporarily raises prices, allowing sellers (liquidity suppliers) to profit by selling high now and buying back lower later.
  - **Variability of Order Flow or Volume**: Stocks with high variability experience lower future returns. Explanation: divergence of opinions + short sale constraints. Optimists bid price up, pessimists can't short, price is biased up, corrects later.

- **Option Trades:** Construct the ratio of put volume to put + call volume (P_C = P / (P+C)), using buy volumes for actively traded options. Buying stocks in the lowest P_C quintile and selling the highest P_C quintile yields returns (e.g., 40 bps the next day). Explanation: Information. Traders with important info may use options ("more action for a given investment"). High P_C stocks should underperform low P_C stocks if informed traders buy puts on bad news and calls on good news. Comparing prices (Risk reversal = IVPUT - IVCALL) also provides signals.
- **Interest Rates**: Intraday rate movements can predict stock returns; higher rates usually mean lower future returns. Establish short-term stock futures positions based on rate futures changes. FX returns might also predict stock returns or vice versa.
- **Lower Frequency Interest Rate Effects:** Choose stocks based on expected rate environment. Merrill Lynch model: when rates expected to increase, buy stocks with high dividend growth, high earnings growth, low leverage. Logic: dividend growth tendency/ability, healthy firms not burdened by interest. Consider dividend yield ('Dogs of the Dow'); high yield stocks could suffer if r increases (P drops).
- **Insider Trades**: Insiders (officers, blockholders) trading in response to private information. Insider buying predicts high prices, selling predicts low prices. Officer (especially CEO) trades are most informative. Large trades and trades in smaller firms are more informative.
- **Short Interest (SI):** Can be bearish (informed bets) or bullish (harder to short heavily shorted stocks, potential squeeze). Available frequently (twice a month in US/Canada). Reported as # shares and # days to cover (Short interest ratio = SI/Avg daily volume). Aggregate US SI negatively predicts market returns over various horizons (1 month to 1 year).
- **Commitments of Traders (COT):** Published weekly by CFTC, reports open futures positions of large speculators (non-commercial), hedgers (commercial), and small traders (non-reportable). Useful indicator of market sentiment, though doesn't cover all assets/positions (e.g., forwards in FX).
- **Prediction Omens**: The Hindenberg Omen (predicts crash, logic unclear), The Super Bowl Winner (NFC win → market rises, AFC win → market falls, historically high success rate but potential issues like market tendency to rise and changing NFC/AFC win balance).

- **Evaluating Trading Rules**

Need to consider both **risk** and **return**.

- **Risk Metrics:** Variance (or std dev), CAPM beta, frequency of negative profits, worst case loss, maximum drawdown.
- **Return Metrics:** Mean, median, frequency of positive profits, Sharpe ratio, Alpha. Examine **net return after trading costs.**
- **Momentum Profits:** US momentum distribution is left-skewed and fat-tailed, with a positive mean and alpha. Canadian momentum showed historically rich returns but also significant drawdowns ("momentum crashes"). Always worry about hidden risks like maximum drawdown.
- **Data Mining:** A significant issue. Trying many rules will produce some profits purely by chance, which are unlikely to be profitable in the future.
- **Dealing with Data Mining**: Out-of-sample analysis, subperiod analysis, backtesting, examining profit size not just statistical significance.
- **Evidence**: FX evidence (Neely, 1997) found positive average returns for filter rules and MAs, but also large worst-case losses. MA was more successful than filter rules. Stock market evidence: 0.5% filter beat buy-and-hold before costs, but high trading costs led to loss of capital.

- **Who Should Use Technical Analysis?** Institutions rather than individuals due to lower transaction costs, better risk handling, and resources for discovery. Short-term traders (fundamentals dominate long-term); contrarian strategies might be an exception.
- **Four Steps in Technical Analysis**:
    1. **Find the pattern:** Guided by a hypothesis, search a sample period, keep a holdout sample (before and after), examine profit distribution.
    2. **Conduct robustness checks**: Confirm in holdout periods and subperiods, account for risk/return.
    3. **Introduce a simulated strategy**: Use real-world data to confirm profitability without committing capital.
    4. **Set up your hedge fund**: If rule makes money, use own capital initially before potentially using borrowed funds.
- **Predicting Economic Conditions**
    - Useful because order imbalance and expected returns vary with economic conditions, aiding trade and price prediction.
    - Use financial series, often from the bond market.
    - **Default Spread (DEF):** Difference between lower-grade bonds and Treasuries. High DEF when economic conditions are poor.
    - **Term Spread (TERM):** Difference between long-term and short-term Treasuries (e.g., 10Y - 1mo/3mo, or 10Y - 2Y). High TERM when economic conditions are expected to improve. Negative spread is a reliable recession signal.
    - **Treasury Eurodollar Spread (TED):** Difference between Eurodollar borrowing rate and matching T-bill rate. High TED when credit/economic conditions are poor. Series discontinued (3-mo LIBOR replaced by SOFR).
    - **Other Predictors:** Implied volatility (VIX/VXO for equity, MOVE for interest rates). High volatility when economic conditions are uncertain or poor